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CHERIMOYA AND GUANABANA IN THE ARCHAEOLOGICAL RECORD OF PERU

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ABSTRACT.—Most researchers commonly assume that both cherimoya (*Annona cherimolia*) and guanabana (*Annona muricata*) have long been a part of the prehistoric record of ancient Peru. However, archaeological and ethnohistoric research in the past 25 years strongly indicates that cherimoya was not introduced into Peru until ca. A.D. 1630 and that guanabana is only present after ca. A.D. 1000 and is mainly associated with sites of the Chimu culture.

RESUMEN.—La mayoría de los investigadores suponen que tanto la chirimoya (*Annona cherimola*) como la guanábana (*Annona muricata*) han sido parte del registro prehistórico del antiguo Perú por largo tiempo. Sin embargo, las in vestigaciones arqueológicas y etnohistóricas de los últimos veinticinco años indican fuertemente que la chirimoya no fue introducida al Perú sino hasta 1630 D.C., y que la guanábana está presente sólo después de aproximadamente 1000 D.C., y está asociada principalmente con sitios de la cultura chimú.

RÉSUMÉ.— La plupart des chercheurs supposent couramment qu'une espèce de pomme cannelle (*Annona cherimolia*) et le corossol (*Annona muricata*) ont fait partie, pendant une longue période, de l'inventaire préhistorique du Pérou. Toutefois, les recherches archéologiques et ethnohistoriques des vingt-cinq dernières années indiquent fortement que la pomme cannelle *A. cherimolia* ne fut introduite au Pérou qu'aux environs de 1630 apr. J.-C. et la présence du corossol n'est attestée qu'en 1000 apr. J.C. et uniquement associé aux sites de la culture chimú.

Two members of the custard apple family (Annonaceae), cherimoya or chirimoya (*Annona cherimolia* Mill.) and guanabana or soursop (*Annona muricata* L.), have long been cited as important tropical fruits for the prehistoric inhabitants of ancient Peru. However, archaeological research over the past 25 years has uncovered evidence indicating that current general perceptions of the past utilization and importance of these two fruits are based on misconceptions. Current evidence suggests that cherimoya was not introduced to Peru until the early 17th century whereas guanabana was introduced to Peru in late precolumbian times and is associated almost exclusively with Chimu sites dating to A.D. 1000 or later.

Modern botanical information on the two species is limited. The native home of the cherimoya is believed by some botanists to be the temperate mountain valleys of southwestern Ecuador near the area of Loja (National Research Council 1989:229), although most authorities suggest that its wild habitat extends into similar valleys in northern Peru (De Candolle 1959:176; Hill 1952:417; MacBride 1938:757; Popenoe 1921:334, 1945:17; Rehm and Espig 1991:193; Sauer 1950:528; Towle 1961:38). Cherimoya is currently more widely grown and eaten than guanabana, although its popularity and production, even in Latin America, are

still much less than such introduced fruits as bananas and oranges. Cherimoya is grown and eaten as a dessert fruit and used as a flavoring or filling in most of western South America, parts of Central America, and Mexico, and is consumed in limited quantities by people in the United States, Japan, and western Europe (National Research Council 1989:229). Along coastal Peru, most cherimoya trees occur as part of house gardens and are not grown in large commercial orchards (ONERN 1972a:226, 259, 1972b:236, 1973:182).

Native habitat information about guanabana is less well known. Most authorities state that guanabana is native or probably native to the West Indies (De Candolle 1959:173; Hill 1952:418; MacBride 1938:752; MacMillan 1956:248). Sauer (1950:427) states that guanabana, a more tropical fruit than cherimoya, was widely grown in early times from Central America to southern Peru; however, this distribution undoubtedly reflects artificial extension of the natural growing area of guanabana by humans during some undetermined time in the past. In Peru, guanabana, like cherimoya, is eaten as a dessert fruit and used as flavoring and filling. It is also grown in house gardens, but is much less frequently seen at local markets.

Both cherimoya and guanabana are desirable because each fruit contains a large amount of sweet white pulp. Of the two fruits, cherimoya has slightly sweeter, less fibrous pulp than guanabana—characteristics that most likely account for its current greater popularity. Both contain a number of dark brown to black seeds imbedded within the pulp of the fruit. There is overlap in the fruits' size and shape. Cherimoyas normally weigh about 0.5 kg, but can weigh up to 3 kg. They vary in shape—heart-shaped, conical, oval, or irregular. Guanabanas, on the other hand, tend to be somewhat larger and even more irregular in shape, and can weigh up to 7 kg (National Research Council 1989:237-238). Both have a dark green skin that is "bumpy" in appearance, but this is where the similarity ends. Close examination of a cherimoya (Figure 1) reveals that it has large, scalelike impressions or prominent protuberances whereas a guanabana (Figure 2) has distinctive small, prickly bumps that make it feel rough to the touch. This difference in external appearance provides one of the key clues concerning the proper identification and role of both cherimoya and guanabana in the archaeological record of Peru.

Of the 19 species of *Annona* recorded from Peru (Brako and Zarucchi 1993:38-40), only three species, *Annona cherimolia*, *Annona muricata*, and *Annona squamosa*,

FIGURE 1.—Whole cherimoya (*Annona cherimolia*) fruit showing large scalelike protuberances on its exterior.

FIGURE 2.—Whole guanabana (*Annona muricata*) fruit showing small, prickly protuberances on its exterior.

have been cited as part of the prehistoric archaeological record of Peru (Towle 1961:18-19). Of the three species, the sweetsop, *Annona squamosa*, can be readily dismissed as a misidentification. The only claim for its pre-Columbian presence is a single statement made Wiener (1880:601) who says that the sweetsops were used as models for pottery vessels. Although no illustrations accompany this statement, it is highly likely that he was referring to Chimu pottery modeled after guanabana fruit (see below).

FIGURE 3.—Comparison of (a) modern cherimoya (*Annona cherimolia*) seeds, (b) modern guanabana (*Annona muricata*) seeds, and (c) archaeological guanabana seeds from Manchan in the Casma Valley. Guanabana seeds have a distinctly ribbed surface, are strongly laterally compressed and elliptic in section with a well-developed or thickened hilum. Cherimoya seeds are less strongly compressed and subterete in section with a weakly-developed hilum.

The actual seeds of cherimoya and guanabana resemble one another to a certain degree, but are distinct from seeds of other species of *Annona*. As part of the research for this paper, we made a comparative study of *Annona* seeds at both the New York Botanical Garden and the Harvard Herbaria in August 1996. Cherimoya and guanabana seeds at both institutions closely resemble our recent collections of cherimoya and guanabana seeds from Peru (NYBG voucher number E-581 for cherimoya; NYBG voucher number 2086 for guanabana). None of the other 17 species bears many similarities to either cherimoya or guanabana.

To the untrained eye, the seeds of cherimoya and guanabana can be easily confused. We believe that this is the reason for previous claims for the presence of cherimoya in the prehistoric record of coastal Peru. In 1970, when one of us, Shelia Pozorski, conducted her first midden excavation in Peru, she initially identified the numerous seed remains from Cerro La Virgen in the Moche Valley as cherimoya. However, with the help of a local consultant, Rudolfo Gutierrez, who brought her examples of both fruits, she was able to correctly identify the seeds as guanabana and ultimately to demonstrate that no cherimoya seeds were present (Griffis 1971:58, Table 7). Subsequent to the 1970 field season, we have made several collections of

modern cherimoya and guanabana specimens from various areas between the Lambayeque and Rimac Valleys of coastal Peru. Examinations of these specimens have demonstrated the validity of the distinction between the two seed types.

The seeds of the two fruits are similar, but close inspection shows that they can be readily distinguished and correctly identified. Both cherimoya seeds and guanabana seeds are similar in color (dark brown to black) and in size (cherimoya [n = 173]: 12.5-20 mm long [mean = 17.2 mm], 7.5-12 mm wide [mean = 9.6 mm], 5-8.5 mm thick [mean = 6.5 mm]; guanabana [n = 195]: 14-20 mm long [mean = 17.2], 8.5-13 mm wide [mean = 10.1], 4-8 mm thick [mean = 6.1 mm]). However, guanabana seeds have a distinctly ribbed surface, are strongly laterally compressed and elliptic in section with a well-developed or thickened hilum. Cherimoya seeds are less strongly compressed and subterete in section with a weakly-developed hilum (Figure 3). The distinction between the two types of seeds is especially important because seeds are normally the only remains of these fruits encountered in the archaeological record. Dr. Michael Dillon, Curator of Phanerogams at the Field Museum, has verified this distinction between the two seed types (Michael Dillon, personal communication, February 1997). We have deposited voucher specimens of modern cherimoya and guanabana seeds from Casma as well as archaeological guanabana seeds from the site of Manchan at both the Department of Botany at Southern Illinois University and the Field Museum of Natural History in Chicago (Field Museum voucher numbers: modern cherimoya = F1960628; modern guanabana = F1960633; archaeological guanabana = F1961656).

ARCHAEOLOGICAL RECORD FOR CHERIMOYA AND GUANABANA

General works on Peruvian prehistory frequently state that both cherimoya and guanabana were utilized by ancient Peruvians, beginning with the Moche culture (100 B.C.-A.D. 600) on the north coast (Bennett and Bird 1960:117; Benson 1972:78; Lanning 1967:15, 179; Lumbreras 1974:102; Mason 1969:76). References to the two fruits, however, are invariably included as part of a sentence listing a series of plants cultivated by the Moche people, without any critical assessment of the validity of the statement. All the authors of these general references apparently derived their lists, without much alteration, from Larco Hoyle (1946:163). In contrast, *Moche Art of Peru*, a much more in-depth work on the Moche culture, does <u>not</u> list either of the fruits as part of the Moche plant inventory (Donnan 1978:56-64).

The published archaeological evidence concerning cherimoya and guanabana is surprisingly sparse. Two lines of evidence have traditionally been used to support the existence of the two fruits in the prehistoric record of Peru—pottery vessels molded into the shapes of whole fruits and seed remains from the fruits (Figures 3-4). Claims that pottery vessels were made from molds of the actual cherimoya fruit first appeared in the late 19th century (Wiener 1880:601) and persisted into the 20th century (Safford 1917:19; Towle 1961:38-39). In no case, however, has an illustration of a cherimoya vessel been published. Pottery vessels based on molds of guanabana fruit have also been reported since the late 19th century (Safford 1917:19; Towle 1961:39; Wiener 1880:601), and such vessels do exist, but are rarely

illustrated (Yacovleff and Herrera 1934: figure 1f). Our personal observations of museum collections and exhibits in Peru have revealed that only the Chimu culture, dating to the Late Intermediate Period (A.D. 1000-1470) of the Peruvian north coast, produced pottery vessels, usually jars, that realistically depict whole fruit. Even though they are consistently mislabeled as cherimoya, these vessels invariably depict guanabana (Figure 4). The skin of the fruit depicted on these vessels has the small, prickly bumps that are distinctive of guanabana fruit. We have never seen a cherimoya vessel, and this observation concurs with Yacovleff and Herrera's (1934:276) detailed study of ceramics in the National Museum in Peru.

FIGURE 4.—Late Chimu blackware jar depicting a whole guanabana fruit. Chan Chan site museum.

Actual botanical remains of cherimoya and guanabana have not often been reported. Costantin and Bois (1910:257, figure 10) illustrate one of five reputed cherimoya seeds found in the late 19th century at the site of La Rinconada near Lima on the central coast of Peru (Figure 5). The illustration provided is not of high quality, but the seeds depicted are more similar to seeds of guanabana, having a ribbed appearance and a flattened perimeter ridge. Safford (1917:19) describes three varieties of cherimoya that reputedly came from unspecified prehistoric graves at Ancon, located just north of Lima (Figure 5). He does not illustrate any of these specimens, however, making it difficult to assess his claim. Nevertheless, Safford (1917:19) appears to be the primary source upon which subsequent authorities base the identification of cherimoya in the prehistoric record, apparently without any subsequent confirmation of identification (Sauer 1950:528; Towle 1961:38-39; Yacovleff and Herrera 1934:276).

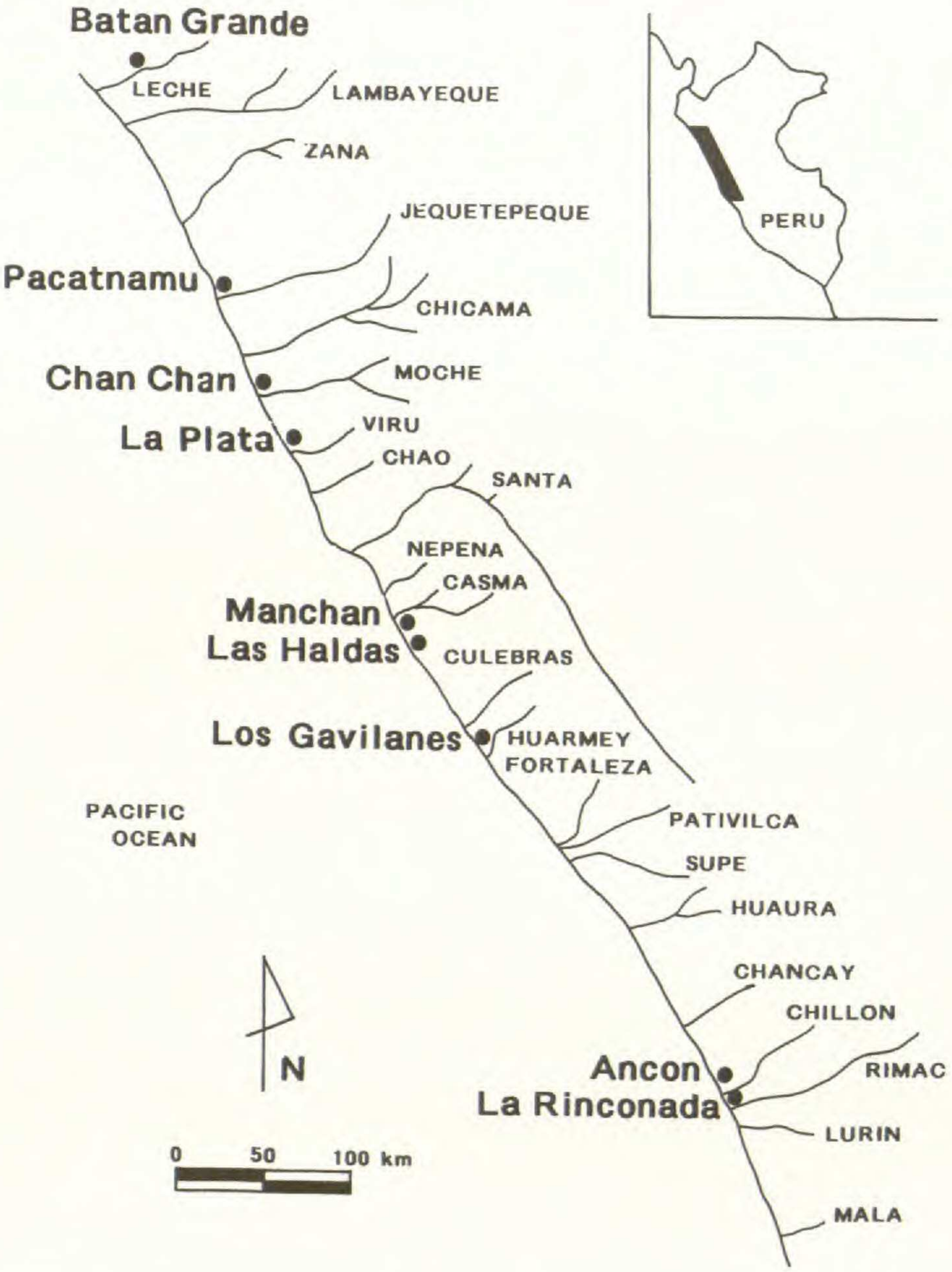

FIGURE 5.—Location of prehistoric sites where seeds have been identified as guanabana (*Annona muricata*) or cherimoya (*Annona cherimolia*). The authors believe all of these examples to be guanabana and to date after ca. A.D. 1000.

In the more recent archaeological record, Shimada (1980:172) states that cherimoya was found at Sapame, within the Batan Grande complex of the La Leche Valley of the north coast of Peru (Figure 5), in stratigraphic layers dating somewhere between the Middle Horizon (A.D. 600-1000) and the Late Horizon (A.D. 1470-1532). Botanical identifications were done by Melody Shimada. These specimens are not illustrated, however, and his Table 4 (Shimada 1980:202) lists the remains as *A. muricata,* not *A. cherimolia*. We believe that these are more likely guanabana remains, the dates of which are somewhat uncertain because of their archaeological context. At Pacatnamu, near the mouth of the Jequetepeque Valley (Figure 5) , Gumerman (1991:95-102) reports abundant guanabana remains from

the Chimu occupation that dates between A.D. 1100 and 1370 (Donnan 1986:22). His identification of the guanabana remains agrees with our direct observations of seed remains at the site. In the Viru Valley, Collier (1955:214) recovered two guanabana seeds (identified by Hugh C. Cutler) at the late Chimu site of La Plata (Figure 5). No guanabana remains were recovered from the pre-Chimu sites of Castillo de Tomaval and Huaca de la Cruz (Towle 1952:352-356).

Popper (1982:149-151) states that nine cherimoya seeds were found in the upper levels of Los Gavilanes, a Late Preceramic (2500-1800 B.C.) site excavated by Bonavia (1982) in the Huarmey Valley on the north central coast (Figure 5). Some scholars (Pearsall 1992:190, 194; Quilter 1991:398-399) accept this identification as well as the Late Preceramic date. However, examination of the accompanying illustration (Popper 1982:fotografía 32) plus a brief personal inspection of the seeds in 1978 at Bonavia's laboratory in Lima have convinced us that these seeds are actually those of guanabana. Moreover, given the small number of seeds found, their context, and the presence of late ceramic sites very near Los Gavilanes, it seems very likely that the nine guanabana seeds are late intrusions into the early site. In the Casma Valley on the north coast, Fung Pineda (1969:54, 128) recovered seeds that she very tentatively identified as cherimoya from a test pit containing Chimu-related ceramics at the coastal site of Las Haldas (Figure 5). No illustrations of these seeds are provided, making assessment difficult. However, our personal observations of the midden in the vicinity of the test pit, where remains of guanabana seeds are visible, suggest that her collections were seeds of guanabana, not cherimoya.

Our own excavations and studies of subsistence in the Moche and Casma Valleys on the north coast have never uncovered a single cherimoya seed. Guanabana seeds, on the other hand, are extremely common, but only in association with Chimu sites dating to the Late Intermediate Period. In the Moche Valley (Figure 5), the late Chimu sites of Chan Chan, Cerro La Virgen, Choroval, and Caracoles all contain abundant remains of guanabana seeds (Griffis 1971:58, Table 7; S. Pozorski 1976:159, 165, 172, 181, 189, 201; 1979:180, Table 2; 1980; 1982:183-196). Significantly, no guanabana seeds were recovered from the early Chimu reoccupation on top of Huaca del Sol nor in any of the other five excavated middens dating to pre-Chimu times (S. Pozorski 1976:223-233; 1979:Table 2, 165-180). This strongly suggests that the introduction of guanabana into the Moche Valley did not occur until after the early portion of the Late Intermediate Period, probably around A.D. 1100 or 1200.

In the Casma Valley (Figure 5), excavations at Manchan, dating to late Chimu through early Colonial times (A.D. 1300-1600; Mackey and Klymyshyn 1981:101), by Moore (1981:118) recovered large quantities of guanabana seeds and skins. We were consulted to help with analysis of the plant and animal remains from the Manchan excavations and can confirm that all of Moore's identifications of guanabana remains are correct (Figure 3). No cherimoya remains were uncovered, even in the early Colonial portions of the site.

Of the few midden studies from other areas of Peru that have been carried out and published, none has reported remains of either cherimoya or guanabana. These studies include the far north coast near Piura (Huapaya 1991:192), the Ancon-

Chillon portion of the central coast (Cohen 1975:58-60, Table 1; 1978:41, Table 1), the Chincha Valley of the south coast (Sandweiss 1992:124-135), and the Upper Mantaro region of the central highlands (Hastorf 1993). Although future studies may expand distribution patterns, current evidence of guanabana remains appears restricted to the north and north-central portions of the Peruvian coast.

ETHNOHISTORIC RECORD AND LINGUISTIC EVIDENCE

The early ethnohistoric record in Peru is in accord with the securely dated archaeological evidence for cherimoya and guanabana. During the mid-16th century, Cieza de León (1986:202-204) recorded the presence of guanabana as well as other indigenous and introduced European crops growing along the Peruvian coast. Significantly, however, although Cieza de León is known to have been a careful observer, cherimoya is not mentioned. Subsequently, Father Bernabe Cobo claims to have introduced cherimoya to Peru from Guatemala in 1629:

> "Only a few years ago the cherimoya was introduced to the kingdom of Peru. I first saw this fruit in the city of Guatemala in 1629 [while] walking to Mexico; this fruit appeared to me so sweet that I felt its absence in this kingdom [Peru]; and thus, I sent from there a good quantity of its seeds to a friend so that he could distribute them among friends which he did. When I returned [to Peru] from Mexico after 13 years, I found many fruit-bearing trees...." (Cobo 1964:240-241, our translation)

Safford (1917:19) refutes Cobo's claim, however, based on his unsubstantiated identification of cherimoya from the Ancon graves. Yacovleff and Herrera (1934:276), while acknowledging Cobo's statement, accept Safford's refutation. S. Pozorski (1976:259), on the other hand, took Cobo, one of the more reputable colonial sources on Peru, at his word because his statement correlated well with her data from the Moche Valley. As discussed above, archaeological evidence uncovered since that time continues to support Cobo's contention that it was he who introduced cherimoya to Peru early in the 17th century or, at the very least, support the view that cherimoya was not introduced to Peru until the early Colonial Period.

Linguistic evidence sheds some light on the issue of the prehistoric presence of guanabana and cherimoya. The word "guanabana" does not appear to be Quechua because it is not glossed in any of the 16 Quechua-Spanish dictionaries produced for the Andean region that we consulted (Academia Mayor de la Lengua Quechua 1995; Carranza Romero 1973; Cerron-Palomino 1976; Cusihuaman 1976; Domingo de Santo Tomás 1951[1560]; Guardia Mayorga 1967; Hornberger and Hornberger 1983; Lara 1971; Lira n.d.; Park, Weber, and Cenepo 1976; Parker and Chavez 1976; Perroud and Chouvenc 1970; Quesada 1976; Ricardo 1951[1586]; Soto Ruiz 1976; Swisshelm 1972). This is not surprising because guanabana is associated archaeologically with the prehistoric Chimu culture which had a more limited distribution on the north and north-central coast where non-Quechua languages persisted until well into the Colonial Period. The word "guanabana" could, therefore, have been part of one or more of the north coast languages associated with

the Chimu or could have been borrowed, along with the adopted fruit, from peoples even further north. However, this word does not appear on any of the few existing word lists for these little-known indigenous north coast languages (Cerron-Palomino 1995:195-203; Kosok 1965:248-249).

"Chirimoya," the Spanish spelling of cherimoya, appears in some, but not all, Quechua-Spanish dictionaries (present in Academia Mayor de la Lengua Quechua 1995:66; Carranza Romero 1973:18; Cusihuaman 1976:38; Lara 1971:84; Parker and Chavez 1976:54; Perroud and Chouvenc 1970:35; Soto Ruiz 1976:38; absent in Cerron-Palomino 1976; Guardia Mayorga 1967; Hornberger and Hornberger 1983; Lira n.d.; Park, Weber, and Cenepo 1976; Quesada 1976; Swisshelm 1972). Significantly, "chirimoya" does *not* appear in the two extant Quechua-Spanish dictionaries from the 16th century (Domingo de Santo Tomas 1951[1560]; Ricardo 1951[1586]). This evidence supports our contention that cherimoya was introduced in colonial times, during the early part of the 17th century. Breaking the word "chirimoya" down into its component parts, we surmise that it comes from "***chiri***" meaning "cold" and "***moya,***" "***muru,***" "***muhu,***" "***muju,***" or "***muya***" meaning seed—although the reasons for the use of this word combination are not entirely clear. Apparently, the word "chirimoya" was coined in the 1630s or later from two Quechua words existing at the time, "***chiri***" and "***moya,***" but only after the fruit was introduced to Peru.

DISCUSSION

The two fruits discussed in this paper, cherimoya (*Annona cherimolia*) and guanabana (*Annona muricata*), have different chronological and spatial distributions of use in Peru. Archaeological and ethnohistoric evidence strongly indicates that cherimoya, despite its current greater popularity compared to guanabana, was not introduced into Peru until about A.D. 1630. No botanical remains (seeds or plant parts) of cherimoya have been conclusively shown to have been recovered from securely dated archaeological contexts nor have any depictions of cherimoya ever been documented on pottery vessels or other media in prehistoric Peru. Once cherimoya was introduced from Central America, however, it quickly became a favorite fruit among the coastal Peruvian population because of its sweet flavor. Prior familiarity with guanabana likely facilitated its rapid acceptance and spread.

Guanabana, on the other hand, is present in the pre-Columbian record, but only very late (after about A.D. 1000) and almost exclusively associated with the Chimu culture on the north coast. In fact, we believe that the presence of guanabana seeds is useful as a distinctive time marker for Chimu sites on the north coast. Seeds and occasionally other plant parts such as skins of guanabana have been found in abundance at Chimu sites in the Jequetepeque, Moche, and Casma Valleys, but are absent in earlier middens excavated in the Moche and Casma Valleys. Rare depictions of whole guanabana fruits, which form the bodies of pottery vessels, occur only on Chimu ceramics.

One might ask "Why does guanabana appear so late in the prehistoric record?" and "Why did it become so popular?" The late appearance of guanabana is likely

correlated with the Chimu conquest and incorporation of valleys to the north of the Chicama-Moche Valley heartland into their growing state organization. Contact with people in the Jequetepeque Valley at sites like Pacatnamu probably made the Chimu people aware of guanabana by at least A.D. 1100. During this early expansion northward, the Chimu people added guanabana to their diet (S. Pozorski 1976:277, 1979:180-182, 1980:193, 1982:194-196). Its popularity can be attributed to the sweet flavor of its white pulp. How early and in what manner the people of the Jequetepeque Valley came to utilize guanabana is unknown. It is entirely possible that some sort of tropical forest-coastal trade network was responsible for its introduction into that area.

Certainly questions remain about the origins and distributions of both cherimoya and guanabana in the archaeological record. Cherimoya, as stated above, has not been positively identified anywhere in prehistoric Peru, and archaeological knowledge of guanabana is limited. Due to a less intensive investigation, the use of guanabana in the southern portion of the Chimu state, between the Huarmey and Chillon Valleys, is largely undocumented. Specifically, the seeds from La Rinconada (Costantin and Bois 1910:257) and Ancon (Safford 1917:19), which we believe are guanabana, lack precise cultural affiliation. North of the Jequetepeque Valley, the only possible guanabana remains documented are Shimada's (1982) finds in the La Leche Valley, and their reported date is equivocal. Excavations in far northern Peru; in Ecuador; and in other areas of northwestern South America, Central America, and the West Indies might clarify the aboriginal use of both fruits and reveal evidence of trade relationships. The late introduction of guanabana is of special interest because most prehistoric cultigens are present much earlier in the archaeological record. The introduction of guanabana could be associated with the establishment of new trade and/or political relationships between the Peruvian north coast and the highland and tropical forest areas of far northern Peru and southern Ecuador.

Given the preservation conditions within many of these areas, however, the chances of recovering physical remains of the fruits are less than optimal. Nevertheless, given modern archaeological recovery techniques and emphases on subsistence reconstruction, attempts to recover botanical remains of cherimoya and guanabana along with other floral and faunal remains should be a part of overall investigative strategies. Furthermore, the conclusions reached in this paper are based primarily on a careful examination of the archaeological record and secondarily on the ethnohistoric record. This fact should serve as a reminder that the archaeological record, despite its incompleteness, can effectively be used to more accurately document specific events as well as correct preconceived ideas about past phenomena.

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